

# AVIATION OPERATIONS

## Energy Leadership in Action

Maintaining America's superior air presence burns a lot of fuel—over 2.5 billion gallons of aviation fuel each year to be exact—and creates a responsibility the United States Air Force does not take lightly.

The Air Force is committed to making the most of its fuel, because creating and maintaining a strong energy strategy today means ensuring a superior air presence tomorrow.

To decrease reliance on foreign oil and to ensure an energy-conscious environment, a three point energy strategy has been created that integrates demand-side energy efficiency measures with a long-term commitment to supply-side alternative energy sources. On the supply side, the Air Force has programs in renewable energy and alternative fuels. On the demand side, there are programs in energy efficiency/conservation, sustainable design, infrastructure investment, and awareness and training.



A B-52 Stratofortress aircraft takes off during a Fischer-Tropsch test flight from Edwards Air Force Base, California in September 2006. During the flight, two of the aircraft's eight engines ran on the natural gas-based Fischer-Tropsch 50/50 fuel blend. (U.S. Air Force photo by Chad Bellay)

## Demand-Side Aircraft Efficiency

Efforts to ensure that fuel is burned efficiently include aircraft design improvements, such as:

- **Optimized aerodynamics** of different aircraft types including radically new aircraft wing and body configurations, such as the blended wing configuration, made possible with the advent of new materials.
- **Advancements in materials engineering** allowing for the use of lighter, stronger alloys and composite materials in aircraft construction, thereby reducing aircraft structural weight and improving fuel efficiency.
- **Advancements in propulsion and engine** technologies have resulted in the use of high bypass turbofans that realize dramatic improvements in the amount of thrust generated per gallon of fuel.



A B-2 Spirit bomber receives fuel from a KC-10 Extender during a training mission near Andersen Air Force Base, Guam. The B-2 Spirit bomber, along with the rest of the fleet, utilizes over 2.5 billion gallons of aviation fuel annually.

(U.S. Air Force photo by Senior Airman Melissa Perry)

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- **Improvements in mission capabilities** have resulted in reductions in fleet size. Advanced avionics, precision-guided munitions, stealth unmanned aerial systems, and other technologies have revolutionized airpower and resulted in fewer, more capable aircraft, being able to accomplish missions with greater success and greater survivability.
- **Innovative use of flight simulators** includes benefits beyond fuel conservation and includes extended airframe life due to less hours flown for training; reducing the number of airframes dedicated for training which frees aircraft for real-world missions; the ability to train aircrew in mission profiles that are not practical or safe in an aircraft; and the capability for aircrews to review, analyze, and debrief performance for a better learning and training experience.

## Supply-Side Programs Lead to Continued Research

In an effort to increase green alternatives as well as decrease reliance on foreign oil, the Air Force has challenged industry and academia to develop and optimize fuel options that can come from within the United States.

One of the most exciting developments is in synthetic jet fuel produced through the Fischer-Tropsch process utilizing coal, natural gas, or biomass. This fuel was flight tested in a B-52 with a 50/50 blend of JP-8 and synthetic fuel. It successfully performed in two engines, in all eight engines, and in cold weather conditions. The C-17 and B-1 were also tested successfully with the same fuel blend. More tests, specifically the F-22 in the near term, are on the horizon. Fuel produced through the Fischer-Tropsch process is environmentally friendly. It burns cleaner than petroleum products and produces fewer particulates and no sulfur dioxide.

The Air Force has served as a critical catalyst for helping green alternative fuels to mature by providing industry incentives and testing and certifying new fuels. In April 2006, the Air Force announced its interest in procuring synthetic jet fuel produced by the Fischer-Tropsch process beginning in January 2009. Industry responded

with 22 companies stating their intention to manufacture this fuel. If such endeavors could acquire appropriate financing, the aggregate stream of synthetic aviation jet fuel by 2016 would far exceed the amount necessary to meet the Air Force stated goal to acquire 50% of domestic crude oil-derived jet consumption via a synthetic fuel blend. The Air Force intends to only buy alternative jet fuels in commercial quantities that have a greener overall environmental footprint than currently available petroleum based fuel.

There is no silver bullet, but rather a combination of processes and technologies that will move the armed forces and the country toward total energy independence. These initiatives not only help close the gap in the Air Force's energy budgets, but also provide the best use of taxpayers' resources and ensure an Air Force that is well-equipped and well-positioned to continue its tradition of excellence.

A C-17 Globemaster III flies over New York City after completing the first transcontinental flight on a synthetic fuel blend December 17, 2007. The C-17 took off before dawn from McChord Air Force Base, Washington, and landed in the early afternoon at McGuire AFB, New Jersey.

*(U.S. Air Force photo)*

